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FUNCTIONAL MEANING OF THE STIFFENED VERTEBRAL COLUMN IN THE NORIAN *SAURICHTHYS* (ACTINOPTERYGII) FROM THE ZORZINO LIMESTONE (NORTHERN ITALY) AND THE ASPHALSCHIEFER (AUSTRIA)

Saurichthys is a basal actinopterygian showing nearly a world-wide distribution during the Triassic Period (Beltan &Tintori, 1980). Its external morphology, resembling a living large needlefish (Belonidae), is that one of a typical accelerator of open space (Gozzi, 2001), and it is rather steady during the time. Some Norian specimens from the Calcare di Zorzino, in Northern Italy ("*Saurichthys* sp.A", Tintori, 1990), and from the Asphalschiefer in Austria ("*Saurichthys seefeldensis*", Kner, 1867) show, from a morpho-functional viewpoint, an extremely interesting character: the neural arcs bears well developed and ossified anterior articular apophyses arranged in a more medial position regard to the neural spines; these processes project forward passing medially to the neural spines of the anteriorly placed vertebra, and they maintain this medial position with regard to the neural spines until their cranial ends, placed roughly over the neural arcs of the fifth or the sixth preceding vertebral element. I refer to this peculiar structure of the vertebral column as the "grille-like structure". According to our morpho-functional analysis, this "grille-like structure" functions like a biological spring restoring the straight position of the fish body, when it is bent. Several other analogous structures have been detected in living fishes (Videler, 1993), but likely none of them is enough *stiff* to influence substantially the locomotion. In our case, on the contrary, the *Young's modulus* of "grille-like structure" is rather high and therefore, when the myomeres bend the body during the propulsive strokes, the *strain energy* stored within this *elastic* structure is not negligible; in other words, the vertebral column of these Norian *Saurichthys* represents a biological spring that shows a direct influence on the swimming (Alexander, 1988). The adaptive advantages of these morpho-functional device can be the following ones: (1) strengthening of the vertebral column towards the dislocations of the vertebrae during high level of activity; (2) saving energy during the locomotion reducing the inertial work to the account of the muscles; (3) the "grille-like structure" and the myomeres show the maximum effectiveness in opposite stages of the propulsion, and so they work in synergy to obtain the maximum thrust; (4) increasing the velocity of the transmission of the energy, i.e. the *power*, from the muscle to the water to obtain the thrust force; (5) dispelling large amount of energy, potentially harmful for the tissues of the fish, during the high level of activity.

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